



IEP NEWSLETTER

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Fish Salvage at the State Water Project and Central Valley Project Fish Facilities in 2004.

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Author is reporting outside the reporting period for this newsletter thus closing the gap for this data.

Introduction

The Tracy Fish Collection Facility (TFCF, Federal Facility) and the Skinner Delta Fish Protective Facility (SDFPF, State Facility) divert (salvage) fish from water exported from the upper San Francisco Estuary. The TFCF began operation in 1957 and the SDFPF began operation in 1968. Both the TFCF and the SDFPF use a louver-bypass system to salvage fish from the exported water. The salvaged fish are returned to the upper San Francisco Estuary by loading the salvaged fish into tanker trucks and trucking them to predetermined release sites.

Exports

The SWP exported roughly 3.96 billion m³ (3,214,000 acre-feet or AF) of water in 2004 less than the 4.37 billion m³ (3,546,000 AF) exported in 2003. Water exports ranged from a low of 56 million m³ (45,023 AF) in May to a high of 524 million m³ (424,810 AF) in January. Monthly exports were lowest from April through June and highest from January through March and June through July (Figure 1). Exports increased from October through December (Figure 1).

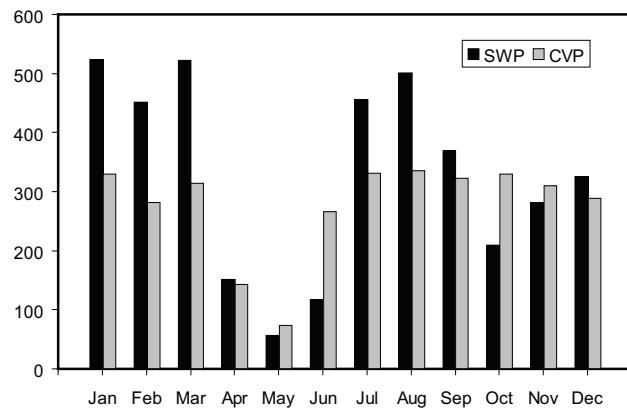


Figure 1 Monthly water exports (million m³) for the SWP and CVP, 2004

The CVP exported roughly 3.32 billion m³ (2,695,000 AF) of water in 2004 less than the 3.43 billion m³ (2,784,000 AF) in 2003. Water exports ranged from a low of 73 million m³ (58,984 AF) in May to a high of 336 million m³ (272,383 AF) in August. With the exception of April through June, monthly exports ranged from 281 – 366 million m³ (215,762 – 272,383 AF) (Figure 1).

Fish Salvage

The composition of salvage at both facilities was dominated by threadfin shad, striped bass, and American shad in 2004. At SWP, roughly 1.84 million fish (34 species) and mitten crabs were salvaged. At CVP, roughly 5.87 million fish (45 species) and mitten crabs were salvaged. At SWP, threadfin shad accounted for 63% of the annual salvage, followed by striped bass and American shad (Figure 2). These 3 species constituted 91% of the annual salvage. At CVP, threadfin shad accounted for 73% of the annual salvage followed by striped bass and American shad (Figure 3). These 3 species constituted 90% of the annual salvage. Generally speaking, the proportion of annual salvage represented by threadfin shad

has been increasing since 1989 (Figure 4). Density of fish (individuals salvaged per 10,000 m³) was highest at SWP in July through August, while at CVP it was highest from November through December (Figure 5).

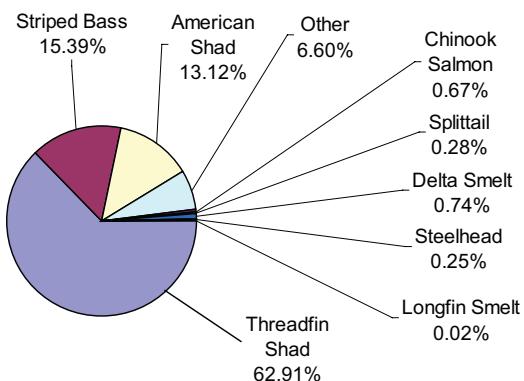


Figure 2 Percentage of annual salvage of the most prevalent species and species of concern at the SWP, 2004

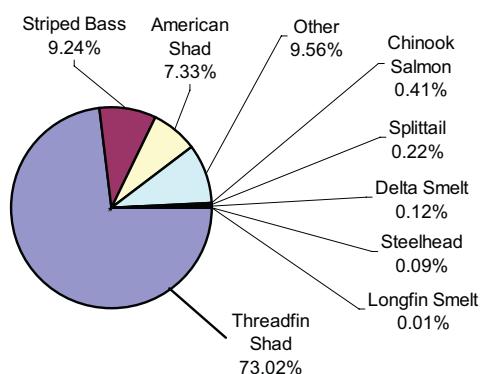


Figure 3. Percentage of annual salvage of the most prevalent species and species of concern at the CVP, 2004

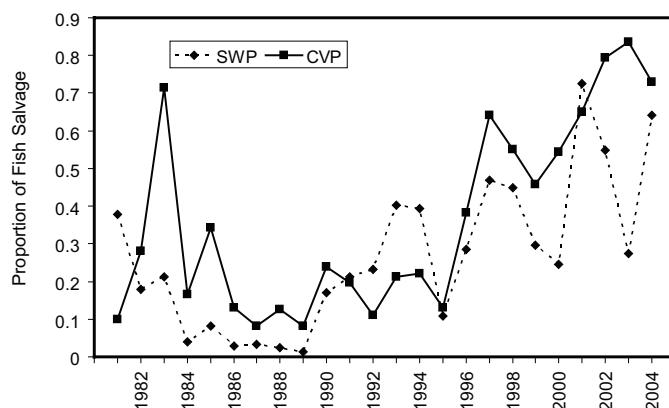


Figure 4 Relative proportion of threadfin shad in annual salvage at the SWP and CVP, 1981 - 2004

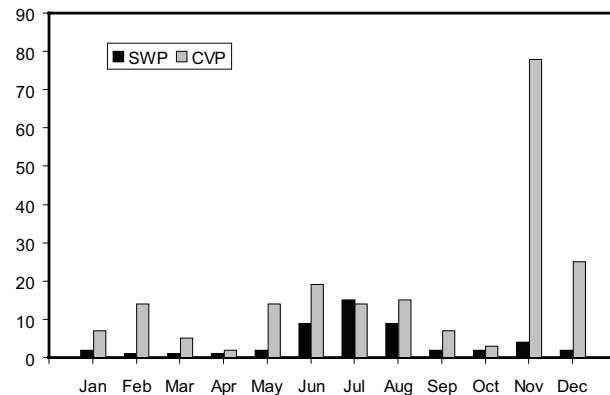


Figure 5 Monthly density (ind/10,000 m³) of fish salvaged at the SWP and CVP, 2004

Delta Smelt

The annual salvages of delta smelt continued a declining trend since 2002 at both facilities (Figure 6). At SWP, 13,694 delta smelt were salvaged in 2004 as opposed to 21,248 in 2003. At CVP, 6,769 delta smelt were salvaged in 2004 as opposed to 16,662 in 2003. Prior to 1988, the salvage of delta smelt was higher at CVP (except for 1983 and 1986) and from 1988 and onwards the salvage of delta smelt is higher at SWP (except for 1998) (Figure 6). Delta smelt salvage in 2004 occurred primarily in 2 pulses: January through March and May through June (Figure 7).

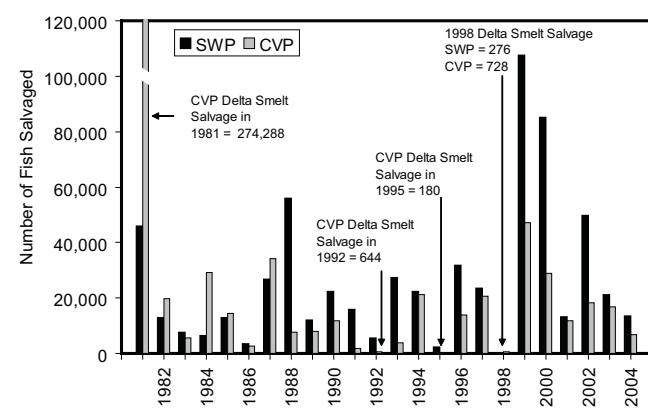


Figure 6 Annual salvage of delta smelt at the SWP and the CVP, 1981 - 2004. The salvage at CVP in 1981 has been truncated for scale considerations

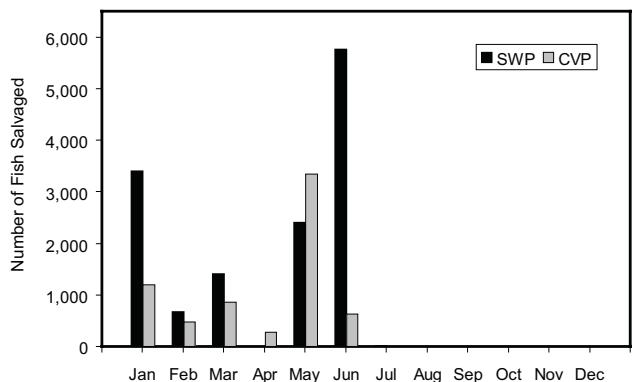


Figure 7 Monthly salvage of delta smelt at the SWP and the CVP, 2004

Chinook Salmon

The combined salvages of Chinook salmon (wild, hatchery, and unknown origin¹) were low in 2004; continuing the trend of low salvage since 2001 (Figure 8). At SWP, combined salvage was 12,411 in 2004 as opposed to 17,492 in 2003. At CVP, combined salvage was 24,217 in 2004 as opposed to 16,498 in 2003.

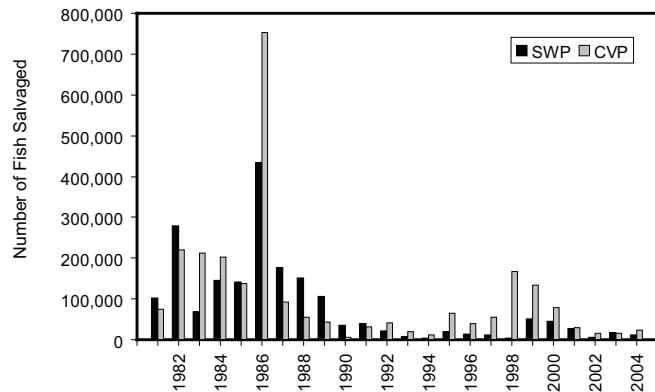


Figure 8 Annual salvage of Chinook salmon (wild and hatchery combined) for the SWP and the CVP, 1981 - 2004

The annual salvages and losses of Chinook salmon in 2004 were composed of primarily wild fish. The salvage of fish of unknown origin was 102 for both facilities combined, less than 1% of the overall salvage. Salvage was higher at CVP while loss (an estimate of mortality resulting from entrainment) was higher at SWP. Combining both facilities, 29,161 wild fish (7,728 at SWP and 21,433

at CVP) were salvaged as opposed to 7,365 hatchery fish (4,665 at SWP, 2,700 at CVP). Combining both facilities, 46,715 wild fish were lost (33,381 at SWP and 13,334 at CVP). The loss of hatchery fish was 20,186 at SWP and 1,806 at CVP for a combined loss of 21,992.

The salvage and loss of wild fish was primarily composed of fall and spring-run and to some extent, winter-run sized fish (Table 1). Race is determined by length alone for salvage/loss considerations. Fall run wild fish contributed to 51% of the wild fish salvage at SWP and 84% at CVP. Fall-run wild fish contributed to 51% of the loss of wild fish lost at SWP and 83% of the wild fish lost at CVP. Salvage/loss of wild Chinook salmon occurred primarily from February through May (Figure 9). Of particular note, the salvage of 15,720 in March at CVP accounted for 73% of all wild Chinook salmon salvage at CVP (Figure 9).

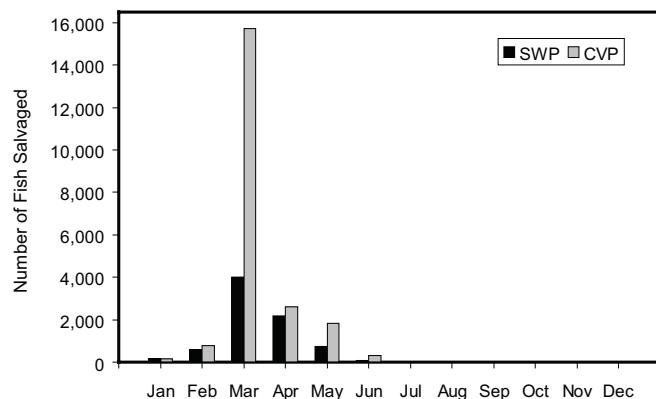


Figure 9 Monthly salvage of wild Chinook salmon at SWP and the CVP, 2004

1. Chinook salmon of unknown origin are fish that were counted, but no adipose clip status was recorded.

Table 1 Wild salmon salvage and loss by race for the SWP and the CVP, 2004

Race	SWP Annual Salvage	CVP Annual Salvage	Total Salvage	SWP Annual Loss	CVP Annual Loss	Total Loss
Fall	3,922	17,976	21,898	16,859	11,066	27,925
Late-fall	18	37	55	80	24	104
Spring	2,188	2,352	4,540	9,458	1,532	10,990
Winter	1,600	1,068	2,668	6,984	712	7,696
Total	7,728	21,433	29,161	33,381	13,334	46,715

Steelhead

The combined salvages of steelhead in 2004 were less than 2003. The SWP salvaged 4,605 steelhead in 2004 as opposed to 5,766 in 2003. The CVP salvaged 5,186 steelhead in 2004 as opposed to 6,871 in 2003. However, salvages in 2003 and 2004 are much larger than in 2002 (Figure 10), and the all time low salvages of 113 in 1998 at SWP and 14 in 1983 at CVP.

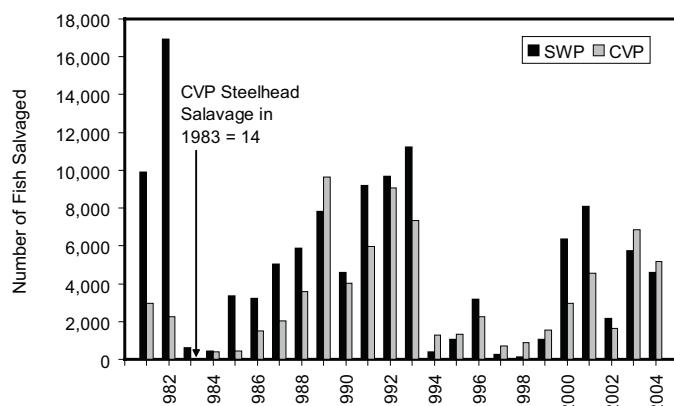


Figure 10 Annual salvage of steelhead (wild and hatchery combined) for the SWP and the CVP, 1981 - 2004

The salvage of steelhead in 2004 was predominately hatchery fish. The SWP salvaged 3,622 hatchery steelhead, comprising 79% of the annual salvage. The CVP salvaged 4,354 hatchery steelhead, comprising 84% of the annual salvage. The SWP salvaged 983 wild steelhead while the CVP salvaged 832 occurring predominately from January through May (Figure 11).

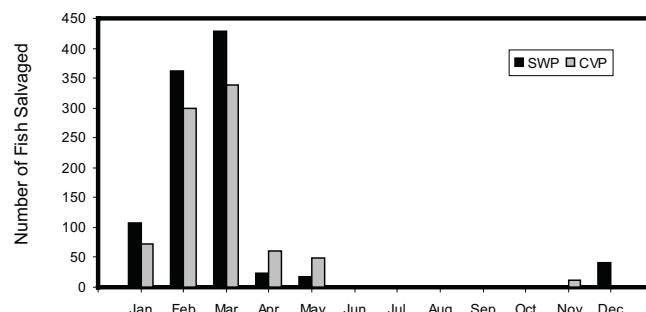


Figure 11 Monthly salvage of wild steelhead for the SWP and the CVP, 2004

Striped Bass

The salvages of striped bass at both facilities were low in 2004, a trend that started in 1994 and has been broken only in 2000 at SWP (Figure 12). Salvage at SWP was 284,006, roughly 1/3 of the salvage in 2003 (753,549). Salvage at CVP was 542,072, over 3 times that in 2003 (165,358). However, even these salvages are proportionally small when compared to previous salvages, especially before 1989, when annual salvages were commonly in the millions (Figure 12).

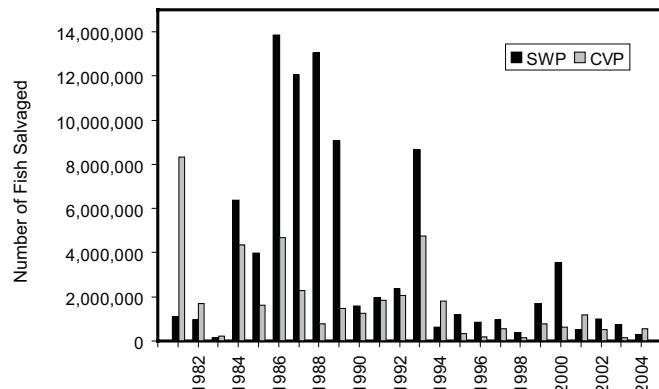


Figure 12 Annual salvage of striped bass at the SWP and the CVP, 1981 - 2004

Salvage of striped bass occurred in all months in 2004 at both facilities (Figure 13). Salvage at SWP ranged from 2,635 in April to 76,284 in June. Salvage at CVP ranged from 2,811 in October to 279,240 in June. The June monthly salvage at CVP accounted for 52% of the annual salvage.

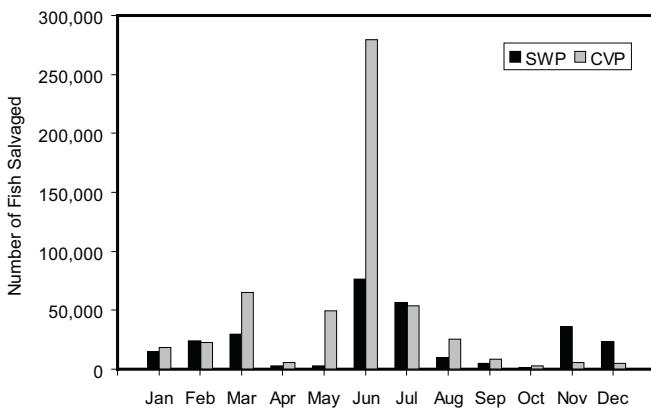


Figure 13 Monthly salvage of striped bass at the SWP and the CVP, 2004

American Shad

The salvages of American shad at both facilities were less in 2004 than in 2003; more so at SWP. The salvage at SWP in 2004 was 242,780, roughly 12% of the salvage in 2003 (2,023,039). The salvage at CVP was 429,978, roughly 88% of the salvage in 2003 (488,033). The majority of annual salvages of American shad at either facility are less than 1,000,000 with the exceptions of 1995, 1996, 2000, and 2003 at SWP (Figure 14).

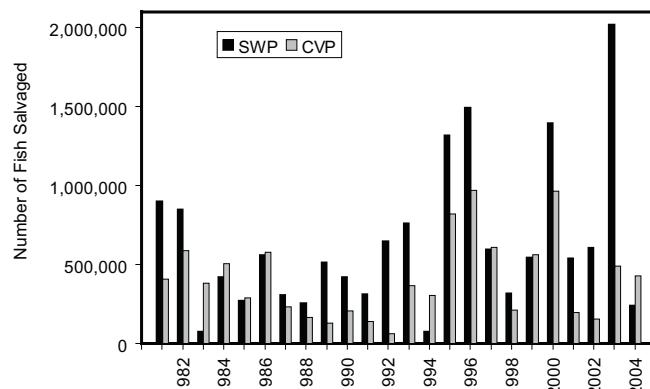


Figure 14 Annual salvage of American shad at the SWP and the CVP, 1981 - 2004

Salvage of American shad occurred during all months for both facilities. At SWP, salvage ranged from 157 in May, to 82,979 in July (Figure 15). At CVP, salvage ranged from 348 in May to 282,012 in November (Figure 15). The July salvage at SWP accounted for 34% of the annual salvage while the November salvage at CVP accounted for 66% of the annual salvage.

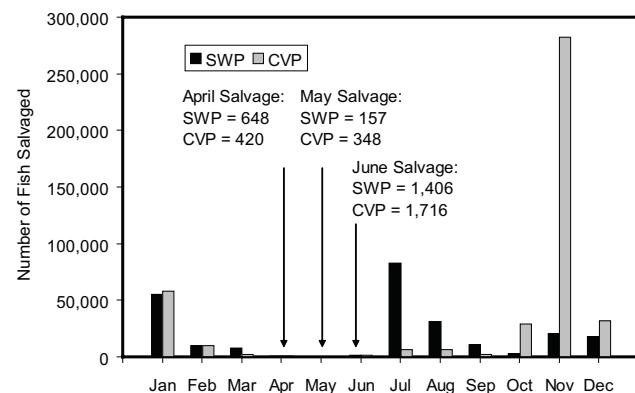


Figure 15 Monthly salvage of American shad at the SWP and the CVP, 2004

Splittail

The salvages of splittail were low at both facilities in 2004, but not unusually low. The SWP salvaged 5,176 and the CVP 13,131. Both salvages were somewhat less than the salvage in 2003: 6,066 at SWP and 13,666 at CVP. The lowest salvages for the period of record, 1981 – 2004, both occurred in 1994: 277 at SWP and 2,824 at CVP. Large salvages of splittail (for this species, greater than 150,000) have occurred only in 1982, 1983 (CVP only), 1986, 1995, and 1998 (Figure 16). Salvage of splittail in 2004 occurred predominately in February and

March at the SWP and in May and June at the CVP (Figure 17).

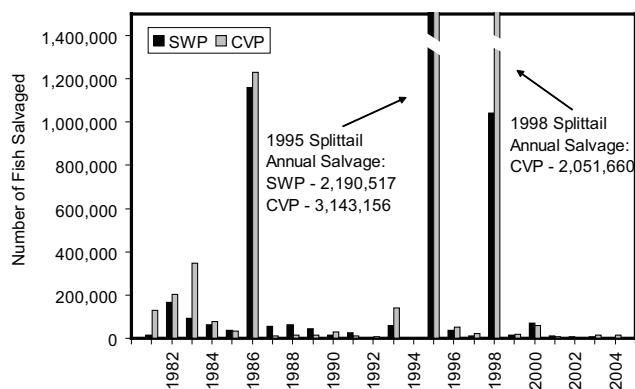


Figure 16 Annual salvage of splittail at the SWP and the CVP, 1981 - 2004

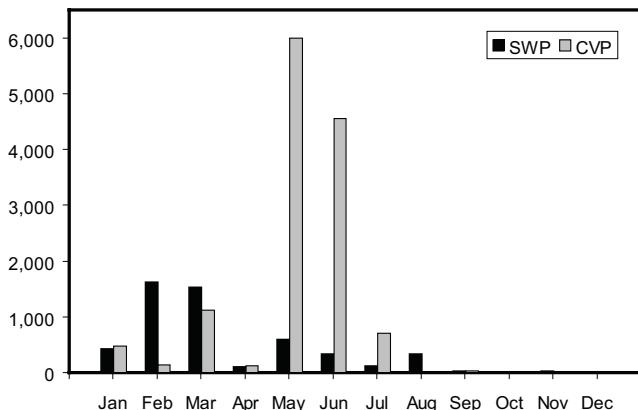


Figure 17 Monthly salvage of splittail at the SWP and the CVP, 2004

Longfin Smelt

Although the salvages of longfin smelt at both facilities were low in 2004, they were not all-time lows or unusual. The salvage at SWP was 333 and at CVP was 648; both lower than salvages in 2003 (SWP: 706, CVP: 4,562). However, the lowest salvages for the period of record, 1981 - 2004, are: SWP, 52 in 1982; and CVP, 0 in 1995. The low salvages in 2004 were not unusual in that since 1990, salvage of longfin smelt has been low, with the exception of 2002 (Figure 18). Large salvages (over 10,000) have occurred only once since 1990 (Figure 18). Salvage of longfin smelt in 2004 occurred primarily in January at the SWP and in April-May at the CVP (Figure 19).

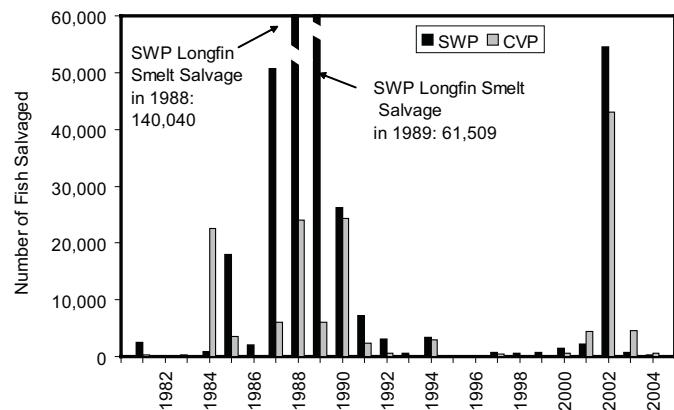


Figure 18 Annual salvage of longfin smelt at the SWP and the CVP, 1981 - 2004

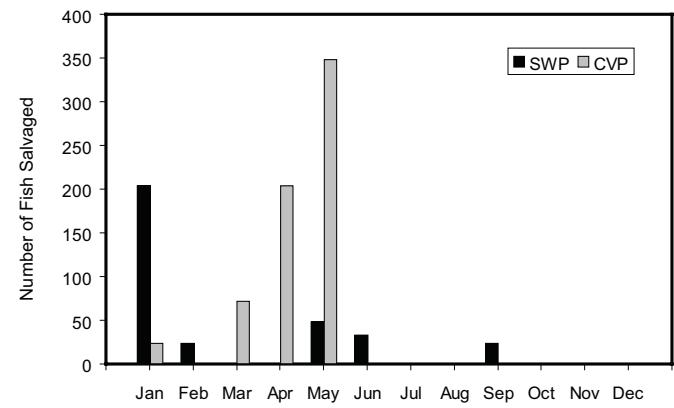


Figure 19 Monthly salvage of longfin smelt at the SWP and CVP, 2004

Chinese Mitten Crabs

The salvage of Chinese mitten crabs (mitten crabs) was low for both facilities in 2004. In general, mitten crabs have been in decline since 2001 for both facilities (Figure 20). The salvage of mitten crabs at SWP was 366. This is an increase from 2003 (160) but much lower than the highest annual salvage from the period of record (1999 – 2004) of 33,903 in 1999. The salvage of mitten crabs at the CVP was 745, a new low for the period from 1999 – 2004. This is slightly less than the salvage in 2003 (804) and much less the high for the period of record, 25,104 in 1999. Salvage of mitten crabs occurred primarily in October at the SWP (72% of annual salvage) and at the CVP (71% of annual salvage).



Figure 20 Annual salvage of mitten crabs at the SWP and the CVP, 1999 - 2004

Salvage data can be obtained from DFG's Central Valley Bay-Delta Branch Web Site - <http://www.delta.dfg.ca.gov/Data/Salvage/>

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Foss S. 2003. Fish salvage at the State Water Project and Central Valley Project Fish Facilities. Interagency Ecological Program Newsletter, Volume 16, Number 2, pages 40-45.

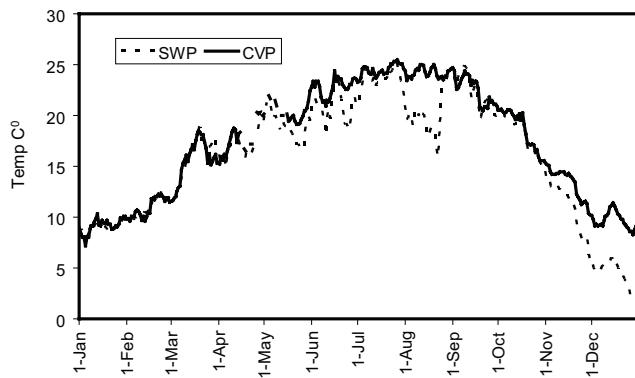


Figure 21 Mean daily temperature (degrees C°) for the SWP and the CVP, 2004

Temperature

Daily mean temperature at both facilities showed the expected annual pattern: low at the beginning of the year, peaking in summer (late July), and a declining trend thereafter (Figure 21), with indications that there were periods when the temperatures were cooler at SWP than CVP. The most noticeable cool periods are from July 28th to August 25th and November 4th to December 31st (Figure 21). However, given the close proximity of the 2 facilities, the “cool” periods at SWP (Figure 21) are questionable and may be the result of a faulty temperature sensor at SWP. A similar problem was documented by Foss (2003) at the SWP in 2002. Given the above, I will report the temperature range and mean annual temperature for the CVP only: 7 to 25 C° with a mean of 17 C°.